```
import numpy as np
import matplotlib.pyplot as plt
import useful as use
import pdb
np.set_printoptions(threshold=np.inf)


fig1, ax3 = plt.subplots()
################################
#initial conditions

r_0 = [(1,0,0)]
v_0 = [(0,.5,0)]
dt = [.4,.2,.1]

##############################################
#Fourth-Order Forest Ruth



for j in range(len(dt)):
    r_0 = [(1,0,0)]
    v_0 = [(0,.5,0)]
    t = 0
    r = r_0
    v = v_0
    s = 2**(1/3)
    H = dt[j]/(2-s)

    for i in range(0,int((6*np.pi)/dt[j])):
        v_n = np.asarray(v[len(v)-1])
        r_n = np.asarray(r[len(r)-1])

        r_n = use.int_q_array(r_n, v_n, .5*dt[j])
        B = np.asarray([0,0,1/(r_n[0]**2)])
        v_n = use.v_magnetic_calc(r_n, v_n, B, dt[j])
        r_n = use.int_q_array(r_n, v_n, .5*dt[j])

        r.append(r_n)
        v.append(v_n)




    r = np.asarray(r)
    x_val = [x[0] for x in r]
    y_val = [x[1] for x in r]
    ax3.plot(x_val,y_val)



##################################################
##################################################
#graphing
ax3.set_ylabel('Y Coordinate')
ax3.set_xlabel('X Coordinate')
ax3.legend(('dt = .4','dt = .2','dt = .1'), loc='upper right')
ax3.set_title("Particle Trajectory - T2 Algorithm", va='bottom')
plt.show()
```